ISAAC LEA'S VIRGINIA NEOGENE SPECIES

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ABSTRACT

Isaac Lea's 1833 essay, "New Tertiary Fossil Shells from Maryland and New Jersey," described six new species: four mollusks, a barnacle, and a foraminiferan. However two substantive errors have plagued this work. Lea's New Jersey fossils were Pleistocene, not Tertiary, and his "Maryland" specimens from the Finch collection were actually collected in Virginia from the younger Yorktown strata. The recognition of correct provenance requires a reinterpretation of these species. *Balanus finchii* Lea is the senior synonym of *B. concavus proteus* Conrad, 1834; it is not conspecific with Pilsbry's (1930) figured "topotypes." The type of *Mactra clathrodon* Lea is a junior synonym of *Spisula modicella* (Conrad, 1833). Lea's supplemental specimens of *M. clathrodon* from Deal, New Jersey were most likely juvenile *Mulinia lateralis* (Say, 1822). *Acteon wetherilli* Lea, the type of *Acteocina* Gray (1847) is a junior synonym of *Acteocina canaliculata* (Say, 1822). *Rotella nana* Lea is a valid species of *Teinostoma*. *Fusus pumilus* Lea is a composite species based on two turrids and a mitrellid. As herein restricted, *F. pumilus* is the type of a previously unrecognized species of *Oenopota*, and becomes the first record of the genus in the Neogene of the Southeastern United States. Finally, *Miliola marylandica* Lea is a junior synonym of *Quinqueloculina seminula* (Linnaeus, 1767).

These conclusions are compatible with the now recognized Virginia source for all Finch collection species described by Thomas Say (1824), Morton (1829), Green (1830) and Conrad (1833).

Paleontologists studying the Eocene molluscan faunas of Alabama have long recognized the importance of Isaac Lea's (1833) *Contributions to Geology*, a work whose fine plates and extensive descriptions set an unrivaled standard of excellence for its time. This privately printed book was a compilation of one major essay, "Tertiary Formation of Alabama," and three essentially overlooked minor essays, "New Tertiary Fossil Shells from Maryland and New Jersey," "New Genus of Fossil Shells from New Jersey," and "Tufaceous Lacustrine Formation of Syracuse, Onondoga County, New York."

Lea was the first Amercian geologist to apply the Lyellian Tertiary epochs to various North American deposits. In the introduction to "Tertiary Formation of Alabama" Lea discussed the likely age of deposits from New Jersey to Alabama. He assigned strata at Yorktown, Smithfield, and Suffolk, Virginia to the Older Pliocene, an age which Rogers (1836) later disputed as too young. Most studies from 1837 to the 1970's have endorsed Rogers' Miocene assignment, but Akers (1972), using planktic foraminifera, has confirmed Lea's original Pliocene assignment.

Molluscs and barnacles listed in Lea's second essay, "New Tertiary Fossil Shells from Maryland and New Jersey," although catalogued by Brönn (1848), H. C. Lea (1848), and Sherbourne (1922-1933), were largely ignored by American systematists. Meek (1864) and Whitfield (1894) failed to include any citation of the species described by Lea.

Regarding these species, Lea stated:

> "I am under obligation to Mr. Finch for this (*Balanus finchii*, Lea, 1833) and many other species from St. Mary's. He very kindly placed them in my cabinet, shortly after his return from the examination of that celebrated deposit, about nine years since" (1833:211-212).

Further, of the portion of the Finch collection described by Thomas Say (1824), Ward and Blackwelder (1975:3-4) observed:

> "Most of the fossils described by Say at this time had been loaned to him by John Finch, a Scottish visitor to the United States. These fossils were mistakenly attributed by Say to Miocene deposits on the St. Marys River, Md. It is apparent from Say's descriptions, illustrations, and material that he had no Maryland collections in his possession at the Philadelphia Academy at this time. Finch's description (1833) of his own travels in America indicates that he probably shipped all the Maryland material he collected directly to England from

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one of the ports in Virginia. The materials which Say examined at the Philadelphia Academy of Sciences were probably collected on Finch's visit to the James River near City Point and the York River at Yorktown (Finch, 1833, pp. 266-275). The molllusks are all indicative of the Yorktown Formation of southeastern Virginia and northern North Carolina."

Ward and Blackwelder's (1975) conclusion, that the Finch collection taxa available to and described by Say came from the younger Virginian Pliocene strata, necessitates reconsideration of the "St. Mary's Maryland John Finch" specimens later described by Lea (1833), Morton (1829), Green (1830), and Conrad (1833). The confusion is understandable because Finch did collect Miocene age specimens from the rich shell beds along the St. Marys River, but those were shipped directly to London. (The apostrophe in "St. Mary's" is now archaic in geographic and geologic usage.) All of Lea's Finch types are housed in the Academy of Natural Sciences Philadelphia collections.

Lea's species in question are:

1. *Balanus finchii. "Description.* Shell short, conicocylindrical, smooth, nearly erect; substance of the shell rather thick; aperture nearly square; valves rather pointed above. Length, 5-20ths, Breadth .3, of an inch." (Lea, 1833:211) ANSP unnumbered.

Status: Balanus finchii was noted by Brönn, 1848, and Darwin, 1854, and was cited as a synonym of *B. concavus* Bronn, 1831 by Martin, 1904. Among the described Yorktown barnacles (see Ross, 1964), *B. finchii* is conspecific with *B. proteus* Conrad, 1834, a conclusion separately determined by Victor Zullo (1980, personal communication) from an examination of the types. Hence, *B. finchii* has priority over the more familiar *B. proteus* as the proper name for the common, strongly-ribbed Yorktown barnacle. Ross (1964) considered the Yorktown form subspecifically distinct from *B. concavus* Bronn; however, Zullo (1984) now references Lea's species to the genus *Concavus* (Newman, 1982), which would make the species *Concavus finchii* (Lea, 1833).

2. *Mactra clathrodon. "Description.* Shell subtriangular, thin, inequilateral, obscurely and transversely striate; beaks somewhat pointed; lateral teeth crossed by equidistant minute striae; excavation of the palleal (sic) impression small and rounded; anterior and posterior cicatrices scarcely visible; cavity of the shell somewhat deep; cavity of the beaks rather deep. Diameter .2, Length 5-20ths, Breadth 7-20ths, of an inch."

"St. Mary's, Maryland, John Finch." ANSP 3309.

"Deal, New Jersey." (Lea, 1833:212).

Status: Conrad (1838) and Brönn (1848) synonymized this species with *Mactra modicella* (Conrad, 1833) which had a few months priority. But Dall (1892:892) rejected this synonym, stating that *M. clathrodon* appeared to be a true *Mactra*. Glenn (1904:286) concluded, "Lea's type specimens are the young of the same species whose adult form Conrad later described as *M. subcuneata.*" Vokes (1957), in turn, observed *"M. clathrodonta* Lea" to be present in all three Maryland Miocene formations, and that it is the most common mactrid in the fauna. Undoubtedly Dall, Glenn and Vokes were influenced in their conclusions by the supposed St. Marys, Maryland source. However, I have compared the cotypes with juvenile Yorktown *Spisula modicella* (Conrad, 1833) of the same size and am convinced, like Conrad and Bronn, that Conrad's and Lea's taxa are conspecific. *Mactra clathrodon* is a junior synonym of *Spisula modicella*, and the Maryland species should properly be called *Mactra subcuneata* Conrad, 1838.

Lea's reference to a second specimen from Deal, New Jersey, introduces a new problem. No St. Marys Formation sediments have been reported in New Jersey, but older Calvert strata can be found in outcrops in the southern part of the state, and in the subsurface of the central and northern parts (Gibson, 1970:1818). Deal is located on the coast, a little south of Newark in the northern part of the state. Most systematists (e.g. Cernohorsky, 1978:83) have assumed that: (1) the Deal specimens were of the same provenance as the Finch material; and, (2) that the latter provenance is the Miocene St. Marys Formation of southern Maryland. It is now apparent that both assumptions are invalid.

Lea reported two species from Deal, the mactrid and a new species of opisthobranch snail, *Acteon wetherilli. Mactra subcuneata* Conrad extends down into the Calvert Formation, and could arguably have been responsible for Lea's "Deal" specimen of *"Mactra clathrodon."* However, there are no reported *Acteocina* from the New Jersey or Maryland Tertiary (Martin, 1904; Whitfield, 1894). The only alternative for Lea's Deal material compatible with the regional geology is the late Pleistocene which Richards (1962:45-46) reports as common in that area. The New Jersey marine Pleistocene contains common juvenile *Mulinia lateralis* (Say, 1822) whose morphology closely parallels *"Mactra clathrodon,"* and also common *Acteocina canaliculata* (Say, 1822) which supplied the type specimen (ANSP 14431) of *Acteon wetherilli.* The synonymy of *A. canaliculata* and *A. wetherilli* has been confirmed by Paul Mikkelsen (1984, personal communication), and is of special systematic interest because the two nominate taxa are respectively the designated types of the genera *Utriculastra* Thiele, 1925 and *Acteocina* Gray, 1847.

3. *Rotella nana. "Description.* Shell orbicular, flattened above, smooth, margin rounded; substance of the shell rather thin; spire nearly concealed; outer lip sharp; callus impressed in the centre, bounded by a fine impressed line; mouth nearly round. Length 1-20th, Breadth nearly .1, of an inch." (Lea, 1833, 214) ANSP 1569.

Status: Gardner (1948: pl. 25, figs. 23-24) has illustrated the type. "*Teinostoma nana* (Lea, 1833)" has been used for very small, low-domed teinostomes with a heavy umbilical callus and a suture that partially overlaps the spire. Such shells are found in the St. Marys, Yorktown and Duplin Formations. These populations appear conspecific, although a detailed study of large populations may eventually prove them to be distinct.

4. *Fusus pumilus. "Description.* Shell ovately fusiform, longitudinally ribbed; substance of the shell thin; spire rather obtuse; suture imperssed; whorls four, slightly convex; columella slightly twisted; canal short; mouth narrow. Length .1, Breadth 1-20th, of an inch." (Lea, 1833) ANSP 13827.

Status: The listings of H. C. Lea (1848), Brönn (1848) and Sherbourne (1922-1933) appear to be the only subsequent references to this species. The type lot consists of three specimens glued to a card. Each is a distinctly different species, and both the original description and figure are composites. Lea (Fig. 226) shows the spire form of the left specimen, the canal of the middle, and the sculpture of the right-hand specimen. The specimen on the left was at first judged to be specifically indeterminate mangelid; the specimen to the right is another indeterminate juvenile turrid. The center specimen is a broken but recognizable juvenile of the common, often cited, and widespread *Mitrella communis* (Conrad, 1862). Restricting the type of *F. pumilus* to this second (middle) specimen would have the advantage of establishing a certain identity, but *Mitrella communis* is well entrenched in the literature, and stability would not be served by such action.

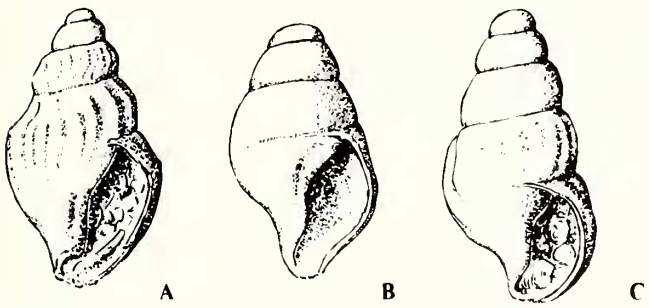

Fig. 1A. Left syntype of *Fusus pumilus* I. Lea, 1833, herein designated lectotype of *Oenopota pumilus* (I. Lea, 1833). Length 1.9 mm. **B.** Center syntype of *Fusus pumilus* I. Lea, 1833, a juvenile specimen of *Mitrella communis* (Conrad, 1862). **C.** Right syntype of *Fusus pumilus* I. Lea, 1833, a juvenile turrid of uncertain species. Figure drawn by Carol Jones.

At my request (1982), Virginia Orr Maes examined the lot and determined that the specimen shown here as Figure 1A belonged to *Oenopota*, a boreal genus of small mangelid turrids. This specimen is designated herein as the lectotype of *Fusus pumilus*. So restricted, *Oenopota pumilus* (I. Lea, 1833) L. Campbell, 1985 is a minute turrid with a small smooth protoconch, and a total of five whorls. The shell is relatively broad, with a slight angulation of the periphery. Visible sculpture (the type is varnished) consists of about eighteen narrow, axial riblets per whorl which are most prominent just above and below the angulation of the whorl. Aperture is large, the outer lip broken. Size: 1.9 mm. Type locality: Virginia. Type: ANSP 13827a.

This is the first record of *Oenopota* in the Neogene of Eastern North America. It has escaped detection because it is very small, easily confused with juveniles of the many other Yorktown Formation turrid species, and finally, as a Boreal genus, it is out of habitat in the warm-temperate to subtropical Yorktown fauna, and therefore predictably rare.

5. *Miliola marylandica*. "*Description.* Shell elliptical, depressed in the middle, rounded at the edges, lobes in contact; mouth small, round, terminal, furnished with a large tooth. Length 1-20th, Breadth nearly 1-20th, of an inch." (LEA, 1833:215) ANSP unnumbered.

Status: Bagg, 1904, correctly synonymized this species with *Quinqueloculina seminula* (Linnė,1767), a common Yorktown and recent species also found in the St. Marys Formation.

CONCLUSIONS

The Virginia source demonstrated by Ward and Blackwelder (1975) for Thomas Say's (1824) "John Finch, St. Mary's" species can now be applied to all species of the John Finch collection which were described by contemporary American systematists. These include *Conus marylandicus* Green, 1830, unknown in Maryland but locally common in the Virginia Yorktown Formation; *Spisula confraga* (Conrad, 1833) which is reported from Maryland but is more common in the Yorktown; *Crepidula costata* Morton, 1829 (not *C. costata* Sowerby, 1824) which is locally abundant in the Yorktown; and five of the six new species described by Isaac Lea (1833). Lea's Finch collection species are *Concavus finchii*, a valid species of barnacle known only from Virginia and North Carolina; *Mactra clathrodon*, a junior synonym of *Spisula modicella* (Conrad, 1833); *Teinostoma nana*, a valid microgastropod species; *Fusus pumilus*, a previously unrevised composite species herein placed in *Oenopota*, a turrid genus; and *Miliola marylandica*, a foraminiferan and junior synonym of *Quinqueloculina seminula* (Linnė,1767). *Oenopota pumilus* is presently known only from the unique lectotype, but the remaining four Lea taxa are common and are unique to, or more common in, the Yorktown Formation. *Acteon wetherilli* Lea, 1833, was not a part of the Finch collection, but rather came from the Pleistocene of Deal, New Jersey. Lea misidentified a Deal juvenile *Mulinia lateralis* (Say, 1822) as conspecific with his *Mactra clathrodon*, therefore presuming the New Jersey and St. Marys Miocene (actually Virginia Pliocene) faunas to be contemporaneous. *A. wetherilli* is a Pleistocene junior synonym of *Acteocina canaliculata* (Say, 1822).

In "New Tertiary Fossil Shells from Maryland and New Jersey" Isaac Lea thus committed two errors: his New Jersey fossils were not Tertiary, and his Tertiary fossils were not from Maryland. After one hundred and fifty years of confusion, recognition of true provenance allows accurate interpretation of these species for the first time.

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